



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION REGARDING THE
PROCEDURES GENERATION PACKAGE FOR
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

1. INTRODUCTION

Following the Three Mile Island (TMI) accident, the Office of Nuclear Reactor Regulation developed the TMI "Action Plan" (NUREG-0660 and NUREG-0737) which required licensees of operating reactors to reanalyze transients and accidents and to upgrade emergency operating procedures (EOPs) (Item I.C.1). The plan also required the NRC staff to develop a long-term plan that integrated and expanded efforts in the writing, reviewing, and monitoring of plant procedures (Item I.C.9). NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," represents the NRC staff's long-term program for upgrading EOPs, and described the use of the "Procedures Generation Package" (PGP) to prepare EOPs. Submittal of the PGP was made a requirement by Generic Letter 82-33, "Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability." The generic letter required each licensee to submit to the NRC a PGP which includes:

- (i) Plant-specific Technical Guidelines
- (ii) A Writer's Guide
- (iii) A description of the program to be used for the validation of EOPs
- (iv) A description of the training program for the upgraded EOPs.

A review has been conducted to determine the adequacy of the New York Power Authority (NYPA) program for preparing the implementing upgraded EOPs for the James A. FitzPatrick (JAF) Nuclear Power Plant and was based on NUREG-0800 (formerly NUREG-75/087), Subsection 13.5.2, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants." As a result of this review, this safety evaluation was prepared to document our findings. Section 2 of this safety evaluation briefly discusses the NYPA submittal, the NRC staff review, and the acceptability of the submittal. Section 3 contains the conclusions of this review.

As indicated in the following sections, our review determined that the procedure generation program for JAF has several items that must be satisfactorily addressed before the PGP is acceptable. NYPA should address these items in a revision to the PGP, or provide justification why such revisions are not necessary. This revision and/or justification need not be submitted to the NRC, but should be retained for subsequent review by the NRC staff. The revision of the PGP, and subsequently of the EOPs, should not impact the schedule for the use, or the planned revision to, the EOPs. The revision should be made in accordance with the JAF administrative procedures and 10 CFR 50.59.

2. EVALUATION AND FINDINGS

In a letter dated June 30, 1983 from J. P. Bayne (NYPA) to D. B. Vassallo (NRC), NYPA submitted its PGP for JAF. The PGP contained the following sections:

- ° Attachment I: Writer's Guide, Verification Program, and Validation Program
- ° Attachment II: Technical Guidelines
- ° Attachment III: Training Program

The NRC staff conducted a review of the JAF PGP, and identified its findings in an Interim Safety Evaluation which was forwarded to NYPA in a letter dated June 10, 1985, from D. B. Vassallo to J. C. Brons (NYPA). NYPA provided responses to the items in a letter dated September 11, 1985 from J. C. Brons to D. B. Vassallo which included a revision to the PGP which incorporated changes to address the identified items. The NRC staff review of the revised JAF PGP, including the response to the items, is documented in the following subsections. The verification and validation program comments are combined in one subsection.

A. Plant-Specific Technical Guidelines (P-STG)

Because staff evaluation of Revision 4 of the generic technical guidelines is now complete, the P-STG program description should be revised to conform with Revision 4 of the General Electric Boiling Water Reactor Owner's Group (BWROG) Emergency Procedure Guidelines (EPGs). Safety significant deviations from the BWROG Emergency Procedures Guidelines should be documented, justified, and archived for future reference.

B. Writer's Guide

The writer's guide was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The writer's guide describes the method of preparing and maintaining EOPs, emphasizing the use of human factors principles. Our review of the JAF writer's guide identified the following concerns:

1. SER Item B.1: The instructions for conciseness and precision in the writer's guide are too vague to ensure that interruptions in the flow of information to operators are minimized. The writer's guide should be revised to require steps, notes, and cautions to be wholly contained on a single page. Furthermore, Section 3.5, page 23, should be revised to indicate that notes and cautions will be placed directly before the step or procedure to which they apply. See NUREG-0899, Section 5.5.2 and 5.5.3, for further information.

2. SER Item B.3: Section 5.5.5 of NUREG-0899 suggests that the step numbering system in the EOPs should provide operators with a logical means of determining where they are in relation to the overall procedure. The use of bullets for more than one purpose, the inconsistency in using digits or bullets to indicate a step, and the multiple sub-divisions of action steps and logic statements in the FitzPatrick procedures do not allow the operator easily to discern where he is in the EOP. A single method of numbering steps should be developed, described in the PGP, and followed consistently in the EOPs. Furthermore, no criteria for the formatting and use of tabs were included in the writer's guide.
3. SER Item B.4: Response acceptable.
4. SER Item B.5: The writer's guide should be revised to present an inclusive list of abbreviations, acronyms and symbols used in the EOPs. Although NUREG-0899 does not specifically state that such a list should be included in the writer's guide, Section 5.6.2 of NUREG-0899 does state that "the abbreviations, acronyms and symbols used in EOPs should be those familiar to operators." The only way to ensure that abbreviations, acronyms, and symbols used in EOPs are familiar to all operators is to limit those which may be used in EOPs to an inclusive list of abbreviations, acronyms, and symbols which all operators are required to know. Furthermore, because different writers will work on different procedures, the only way to ensure consistency throughout EOPs is to require that only abbreviations, acronyms, and symbols from a single list can be used in EOPs. The writer's guide should be revised to include such a list.
5. SER Item B.6: The generic EPGs were not written in accordance with the specific control room characteristics and staffing patterns of FitzPatrick in mind. Further, the procedure-writer should be aware of the specific constraints on operator actions imposed by the control room conditions and staffing patterns at FitzPatrick when writing EOPs. Therefore, the writer's guide should be revised to address the concerns of control room staffing and division of responsibilities described in NUREG-0899, Section 5.8.
6. SER Item B.7: The revised writer's guide does not provide formatting instructions for all types of action steps. The writer's guide should be further revised to include formatting instructions and examples for : (1) steps that are repeatedly performed and (2) steps for which a number of alternative actions are equally acceptable. In addition, although the revised writer's guide includes an example of steps that are to be performed concurrently with other steps (Section 3.3.3, page 19), it does not include specific formatting instructions for such action steps. The writer's guide should be further revised to include such formatting instructions.

7. SER Item B.8: Although the revised writer's guide has been expanded to include examples of logic statements, the examples presented are in need of further revision with regard to the following points:
 - a. The word NOT is included in the list of logic terms provided in Section 4.2, page 25, of the writer's guide. Other than in conjunction with the use of IF, it is unclear how NOT is to be used as a logic term when writing EOPs. Only the logic term IF NOT should be included in the writer's guide.
 - b. Section 4.2, page 26, states that the use of AND and OR within the same action "will be avoided." There are occasions, however, when it is necessary to use AND and OR in the same sentence. The writer's guide should provide specific guidance for acceptable usage in those situations. See NUREG-0899, Appendix B, for additional information.
 - c. The writer's guide does not discuss the difference between the conjunctions "and" and "or" and the logical terms AND and OR. If the difference is not clear, operators could mistake a list for a logic sequence. The writer's guide should specify the formatting of conjunctions so they will not be confused with logic terms.
 - d. Example 1, page 19, and the example page of logic statements, page 26, list the conditions and action statement "IF... any one of the following conditions occur:". This convention should not be used because using IF without THEN may cause operator confusion about consequent actions. Furthermore, using IF without THEN is inconsistent with paragraph three on page 27, which states "the step will begin with the words IF or WHEN followed by a description of the condition or conditions (the antecedent), a comma, the word THEN, followed by the action to be taken (the consequent)." The writer's guide should be revised to reflect this concern.
 - e. Section 4.2, page 27, along with the examples on page 26, incorrectly define the following words as logic terms: EXCEPT, BEFORE, UNTIL, BUT ONLY IF, and BUT ONLY WHEN. Furthermore, Figure 4, page 22, shows the use of combined logic terms (e.g., OR IF, AND IF, OR WHEN). The use of combined logic terms is (1) potentially confusing and (2) inconsistent with the formatting instructions in Section 4.2, pages 25 through 27, of the Writer's Guide. The writer's guide should be revised so that examples are consistent with the text.
 - f. Section 4.2, page 27, discusses the use of a list format when joining three or more conditions with AND. Because of the confusion that can result when logic terms are used in EOPs, we suggest that an example of this list format be provided.

8. SER Item B.9: Response Acceptable.
9. SER Item B.10: It is important that the operators know where to find all of the instrumentation and controls that are referred to in the EOPs. Section 4.7, page 28, prescribes that equipment, controls and displays will be identified in "operator language (common usage) terms," but indicates that these terms may not always match engraved names on panels. In order to ensure that an operator is able to easily recognize the identity of equipment or controls, an approach should be adopted that allows the common terms to be associated directly with the panel engravings.
10. SER Item B.11: Figure 1, page 13, and Figure 2, page 15, shows the page format of the EOP. The word "PROCEDURE" is shown to the left of the procedure designation number in the title line of the writer's guide, but not in either of the examples of the page format. The writer's guide should be revised to correct this inconsistency.
11. SER Item B.12: Top and bottom margins should be discussed in the writer's guide. Specific guidance is necessary, as the text of the example shown in Figure 2, page 15, has been reproduced at an angle and show no borders that would indicate control of the top and bottom margins.
12. SER Item B.13: The full extent of reproduction concerns should be discussed in the writer's guide. The use of a standard copier, the current guidance, does not guarantee that the reproduction will be as legible as the original or that instructions will not be omitted in the reproduction process. The writer's guide should be revised to include sufficient guidance to meet the objectives of Section 6.2.2 of NUREG-0899.
13. SER Item B.14.a: The line spacing in Figure 2, page 15, is inconsistent with the information provided in Section 6.3, page 40, of the writer's guide. The spacing in Figure 2 appears to be double line spacing with double spacing between the heading and the text. Section 6.3 calls for three line spaces between the heading and the text. The writer's guide should be revised so that examples are consistent with the text.
14. SER Item B.14.b: Response acceptable.
15. SER Item B.14.c: Response acceptable.

16. SER Item B.14.d: The most recent revision of AP 2.2 (Attachment 3) does not have an accurate table of contents. In the table of contents on page 2, Appendices A, B, and C have incorrect page number references. In the table of contents on page 9, section titles do not correspond to the titles of sections in the text. In the same table of contents, beginning with Section 3 on page 16, inaccurate page numbers are referenced for the remainder of the sections. The writer's guide, AP 2.2, should be revised again to correct these errors.

As a result of our review of the revised sections of the JAF Writer's Guide, the NRC staff has the following additional comments:

1. Cautions and Notes provide operators with important information concerning specific steps or sequences of steps in the EOPs. The information on notes and cautions in Sections 3.5, page 23, and 6.6, page 41, should be expanded and revised with regard to the following points:
 - a. Section 5.5.3 of NUREG-0899 suggests that caution statements should precede the step(s) to which they apply and should be presented so that they can be read completely without interruption by intervening steps or page turning. The cautions in the EOPs violate this guidance, however, in that they are presented to the side of the action steps to which they apply, there are clusters of caution statements presented near some action steps, and the operator is required to refer to another document to obtain the information associated with each caution (Section 3.5, page 23, and Section 6.6, page 41). Because of the difficulty, and because it is not clear which caution applies to which action step, this technique for presenting cautions encourages operators to skip them, which may result in serious safety consequences for plant operations. FitzPatrick staff should revise their PGP and EOPs to improve their method of presenting cautions.
 - b. Section 3.5.2, page 23, states that notes "shall be typed in italics, between the margins of the associated step." The writer's guide should be revised to state that the note will be typed between the margins preceding the step(s) to which it applies.
2. Section 3.2, page 17, states "The use of footnotes shall be minimized." To ensure that the flow of information from procedures to operators is not interrupted, information that might appear in a footnote should be written and included within the EOP as a note and appear before the step(s) to which it applies. The writer's guide should be revised to state that the use of footnotes is not appropriate.

3. Section 4.10, pages 30 through 32, discusses the use of "miniature figures". Figures and tables assist operators in making decisions and to locate information. It is unclear how using miniature figures could assist operators in making decisions, if, as stated in Section 4.10.3 (page 31), there are no references to miniature figures within the action steps of the EOP, and the placement of these figures varies according to the availability of room (Section 4.10.2, page 30). Therefore, the writer's guide should be revised to discuss why and when the use of "miniature figures" is appropriate.
4. Several considerations should be met to ensure that the vocabulary and syntax used in the EOPs are readily understood by both procedure preparers and operators:
 - a. Section 5.4, page 34 through 37, suggest that the EOPs should be written using the simplest and most definitive words for clarity. For this reason the word "commence" used in the example in Section 3.3.3, page 18, should be replaced with "start" (which is defined in Table 1, the list of acceptable action verbs). Furthermore, the word "slowly" used in the same example is vague, does not describe a specific action, and should be included in a list of words to avoid.
 - b. Sections 4.8, page 29, and 4.9, page 30, show the verb "Place". So that EOPs are consistently formatted, the verb "Place" should either be replaced with a verb from Table 1 (the list of acceptable action verbs), or be included in Table 1 as an acceptable action verb for use in EOPs.

With adequate resolution of the above items, the JAF Writer's Guide should accomplish the objectives stated in NUREG-0899 and should provide adequate guidance for translating the technical guidelines into EOPs that will be usable, accurate, complete, readable, convenient to use and acceptable to control room operators.

C. Verification and Validation Program

The description of the verification and validation program was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. Verification is performed to evaluate the written correctness and technical accuracy of the EOPs. Validation is performed to evaluate the usability and operational correctness of the EOPs. Our review of the JAF verification and validation program description identified the following concerns:

1. SER Item C.1: Response acceptable.

2. SER Item C.2: The verification and validation program description should be revised to specify that the scenarios used during validation will include multiple failures.
3. SER Item C.3: The discussion of simulator sessions in Subsection 7.4.3.3, page 7, of the PGP indicates that a normal crew of operators will be used. However, it should be specifically stated in the PGP that EOPs will be exercised during plant walk-throughs and simulator events with the minimum control room staff size required by the facility's technical specifications, as there may be occasions in which a full crew of operators is not on-duty.
4. SER Item C.4: Response acceptable.
5. SER Item C.5.a: Response acceptable.
6. SER Item C.5.b: Response acceptable.

With adequate resolution of the above items, the JAF verification and validation program should accomplish the objectives stated in NUREG-0899 and should provide assurance that the EOPs adequately incorporate the guidance of the writer's guide and the technical guidelines and will guide the operator in mitigating emergency conditions.

D. Training Program

The description of the operator training program on the JAF upgraded EOPs was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. Operators are to receive comprehensive training on the upgraded EOPs. Our review of the NYPA program description for EOPs identified the following concerns:

1. Although the JAF responses to the items in the SER concerning the training program appear to indicate that the NYPA training program will meet the NRC standards, the description of the training program in the current version of the PGP is not sufficiently detailed to support this conclusion. Furthermore, the PGP is intended to represent JAF's plan for providing training on the current generation of NYPA EOPs as well as for the next generations of new and revised EOPs. For these reasons, the training program should include a detailed training plan which JAF has committed to follow for all future EOPs, rather than as a basic outline which briefly describes the training that occurred with the first set of EOPs.

2. SER Item D.1: Because the training program will be used when operators are trained on future revisions to EOPs, the training program should be revised to include the training objectives and how these objectives will be accomplished by the training program.
3. SER Item D.2: The training program should be revised to indicate the method(s) to be used to train operators in areas where the simulator is unlike the JAF control room or does not react like the plant. Furthermore, the training program should be revised to include the criteria for choosing such a method.
4. SER Item D.3: The training program should be revised to indicate that operators will be trained as a team to use the EOPs and that each operator is to be trained in the role that they would be expected to take in case of an actual emergency.
5. SER Item D.4: The training program should be revised to indicate that a wide variety of scenarios will be used during training.
6. SER Item D.5: The training program should be revised to indicate that all of the EOPs will be exercised in some fashion by all operators.
7. SER Item D.6: The training program should be revised to specifically state that all operators will be trained before EOPs -- including revised EOPs -- are implemented.
8. SER Item D.7: The training program should be revised to describe the method for evaluating operators after training, and for appropriate follow-up training in any deficient areas.

With adequate resolution of the above items, the JAF training program should accomplish the objectives stated in NUREG-0899 and should result in appropriate training for the JAF operators on the upgraded EOPs.

3. CONCLUSIONS

The staff concludes that, to adequately address the requirements stated in Generic Letter 82-33 (Supplement 1 to NUREG-0737) and provide acceptable methods for accomplishing the objectives stated in NUREG-0899 in accordance with the guidance provided in the Standard Review Plan (NUREG-0800, Section 13.5.2), the PGP submitted* should be revised to address the items described in Section 2 of this report. This revision need not be submitted to the NRC. For items in Section 2 that the licensee deems inappropriate for inclusion in its PGP, it should develop and maintain documented justification. NRR or Region I will confirm that all items described in this report have been adequately resolved by appropriate licensee action or justification in the course of routine or special inspections. Licensee implementation of commitments contained in the PGP may also be reviewed--deviations from commitments may result in enforcement action being taken by the NRC. Therefore, all revisions to the PGP should be reflected in plant EOPs within a reasonable period of time. Future changes to the PGPs and EOPs should be made in accordance with 10 CFR 50.59.

*By New York Power Authority for James A. FitzPatrick Nuclear Power Plant in letters from J. P. Bayne (NYPA) to D. B. Vassallo (NRC), dated June 30, 1983 and from J. C. Brons (NYPA) to D. B. Vassallo (NRC), dated September 11, 1985.

Dated:

Principal Contributor

G. Lapinsky